

§ 572.182

(5) Sign convention for signal outputs reference document SAE J1733 Information Report, titled “Sign Convention for Vehicle Crash Testing” dated December 1994, incorporated by reference, see § 572.180.

(b) Exterior dimensions of ES-2re test dummy are shown in drawing 175-0000 sheet 3 of 6, dated February 2008, incorporated by reference, see § 572.180.

(c) Weights of body segments (head, neck, upper and lower torso, arms and upper and lower segments) and the center of gravity location of the head are shown in drawing 175-0000 sheet 2 of 6, dated February 2008, incorporated by reference, see § 572.180.

(d) Adjacent segments are joined in a manner such that, except for contacts existing under static conditions, there is no additional contact between metallic elements of adjacent body segments throughout the range of motion.

(e) The structural properties of the dummy are such that the dummy conforms to this Subpart in every respect before use in any test similar to those in Standard No. 214, Side Impact Protection and Standard No. 201, Occupant Protection in Interior Impact.

[71 FR 75331, Dec. 14, 2006, as amended at 73 FR 33921, June 16, 2008; 76 FR 31866, June 2, 2011]

§ 572.182 Head assembly.

(a) The head assembly consists of the head (drawing 175-1000), including the neck upper transducer structural replacement, and a set of three (3) accelerometers in conformance with specifications in § 572.189(b) and mounted as shown in drawing (175-0000 sheet 1 of 6). When tested to the test procedure specified in paragraph (b) of this section, the head assembly shall meet performance requirements specified in paragraph (c) of this section.

(b) *Test procedure.* The head shall be tested per procedure specified in 49 CFR § 572.112(a).

(c) *Performance criteria.* (1) When the head assembly is dropped in accordance with § 572.112 (a), the measured peak resultant acceleration shall be between 125 g’s and 155 g’s;

(2) The resultant acceleration-time curve shall be unimodal to the extent that oscillations occurring after the main acceleration pulse shall not ex-

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ceed 15% (zero to peak) of the main pulse;

(3) The fore-and-aft component of the head acceleration shall not exceed 15 g’s.

§ 572.183 Neck assembly.

(a) The neck assembly consists of parts shown in drawing 175-2000. For purposes of this test, the neck is mounted within the headform assembly 175-9000 as shown in Figure U1 in appendix A to this subpart. When subjected to tests procedures specified in paragraph (b) of this section, the neck-headform assembly shall meet performance requirements specified in paragraph (c) of this section.

(b) *Test procedure.* (1) Soak the neck-headform assembly in a test environment as specified in § 572.189(n);

(2) Attach the neck-headform assembly to the part 572 subpart E pendulum test fixture as shown in Figure U2-A in appendix A to this subpart, so that the midsagittal plane of the neck-headform assembly is vertical and perpendicular to the plane of motion of the pendulum longitudinal centerline shown in Figure U2-A. Torque the half-spherical screws (175-2004) located at either end of the neck assembly to 88 ±5 in-lbs using the neck compression tool (175-9500) or equivalent;

(3) Release the pendulum from a height sufficient to allow it to fall freely to achieve an impact velocity of 3.4±0.1 m/s measured at the center of the pendulum accelerometer (Figure 22 as set forth in 49 CFR 572.33) at the time the pendulum makes contact with the decelerating mechanism. The velocity-time history of the pendulum falls inside the corridor determined by the upper and lower boundaries specified in Table 1 to paragraph (a) of this section.

(4) Allow the neck to flex without the neck-headform assembly making contact with any object;

(5) Time zero is defined in § 572.189(j).

TABLE 1 TO PARAGRAPH (A)—ES-2RE NECK CERTIFICATION PENDULUM VELOCITY CORRIDOR

Upper boundary		Lower boundary	
Time (ms)	Velocity (m/s)	Time (ms)	Velocity (m/s)
1.0	0.00	0.0	–0.05

TABLE 1 TO PARAGRAPH (A)—ES-2RE NECK CERTIFICATION PENDULUM VELOCITY CORRIDOR—Continued

Upper boundary		Lower boundary	
Time (ms)	Velocity (m/s)	Time (ms)	Velocity (m/s)
3.0	-0.25	2.5	-0.375
14.0	-3.20	13.5	-3.7
		17.0	-3.7

(c) *Performance criteria.* (1) The pendulum deceleration pulse is to be characterized in terms of decrease in velocity as determined by integrating the filtered pendulum acceleration response from time-zero.

(2) The maximum rotation in the lateral direction of the reference plane of the headform (175-9000) as shown in Figure U2-B in appendix A to this subpart, shall be 49 to 59 degrees with respect to the longitudinal axis of the pendulum occurring between 54 and 66 ms from time zero. Rotation of the headform-neck assembly and the neck angle with respect to the pendulum shall be measured with potentiometers specified in § 572.189(c), installed as shown in drawing 175-9000, and calculated per procedure specified in Figure U2-B in appendix A to this subpart;

(3) The decaying headform rotation vs. time curve shall cross the zero angle with respect to its initial position at time of impact relative to the pendulum centerline between 53 ms to 88 ms after the time the peak translation-rotation value is reached.

[71 FR 75331, Dec. 14, 2006, as amended at 73 FR 33921, June 16, 2008]

§ 572.184 Shoulder assembly.

(a) The shoulder (175-3000) is part of the body assembly shown in drawing 175-0000. When subjected to impact tests specified in paragraph (b) of this section, the shoulder assembly shall meet performance requirements of paragraph (c) of this section.

(b) *Test procedure.* (1) Soak the dummy assembly, without suit and shoulder foam pad (175-3010), in a test environment as specified in § 572.189(n);

(2) The dummy is seated, as shown in Figure U3 in appendix A to this subpart, on a flat, horizontal, rigid surface covered by two overlaid 2 mm thick Teflon sheets and with no back support

of the dummy's torso. The dummy's torso spine backplate is vertical within ± 2 degrees and the midsagittal plane of the thorax is positioned perpendicular to the direction of the plane of motion of the impactor at contact with the shoulder. The arms are oriented forward at 50 ± 2 degrees from the horizontal, pointing downward. The dummy's legs are horizontal and symmetrical about the midsagittal plane with the distance between the innermost point on the opposite ankle at 100 ± 5 mm. The length of the elastic shoulder cord (175-3015) shall be adjusted so that a force between and including 27.5 and 32.5 N applied in a forward direction at 4 ± 1 mm from the outer edge of the clavicle in the same plane as the clavicle movement, is required to initiate a forward motion of 1 to 5 mm;

(3) The impactor is the same as defined in § 572.189(a);

(4) The impactor is guided, if needed, so that at contact with the shoulder, its longitudinal axis is within ± 0.5 degrees of a horizontal plane and perpendicular (± 0.5 degrees) to the midsagittal plane of the dummy and the centerpoint on the impactor's face is within 5 mm of the center of the upper arm pivot bolt (5000040) at contact with the test dummy, as shown in Figure U3 in appendix A to this subpart;

(5) The impactor impacts the dummy's shoulder at 4.3 ± 0.1 m/s.

(c) *Performance criteria.* The peak acceleration of the impactor is between 7.5 g's and 10.5 g's during the pendulum's contact with the dummy.

§ 572.185 Thorax (upper torso) assembly.

(a) The thorax assembly of the dummy must meet the requirements of both (b) and (c) of this section. Section 572.185(b) specifies requirements for an individual rib drop test, and § 572.185(c) specifies requirements for a full-body thorax impact test.

(b) *Individual rib drop test.* For purposes of this test, the rib modules (175-4002), which are part of the thorax assembly (175-4000), are tested as individual units. When subjected to test procedures specified in paragraph (b)(1) of this section, the rib modules shall meet performance requirements specified in paragraph (b)(2) of this section.